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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/811,444

03/26/2004

Liang Liu

1474

25859

7590

03/06/2006

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EXAMINER

PATEL, ASHOK

ART UNIT

PAPER NUMBER

2879

DATE MAILED: 03/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/811,444	Applicant(s) LIU ET AL.	
	Examiner Ashok Patel	Art Unit 2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7-23 is/are allowed.
- 6) ☒ Claim(s) 1-5, 24 and 25 is/are rejected.
- 7) ☒ Claim(s) 6 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>032604</u> . | 6) <input type="checkbox"/> Other: ____. |

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the feature of "offset gate electrode in relation to the carbon nanotube array" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required

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corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 24 and 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee et al (USPN 6812480).

Lee et al disclose applicant's claimed field emission display (Figure 1, 2Q, 4, 5R, 7H etc.; col. 1, lines 15-21) including: at least a cathode electrode (112); at least a carbon nanotubes (131) array having an end surface; an anode electrode (not shown); at least a gate electrode (116) arranged between the at least a cathode electrode and the anode electrode; a spacer (115); wherein each carbon nanotube array is in electrical connection with a corresponding cathode electrode, and the end surface of the carbon nanotube array is substantially flush with an end of the spacer.

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As to claim 24, the limitation in the last paragraph (said emission tips are essentially root sections *during growing of said carbon nanotube array*) is not given patentable weight since it refers to an intermediate product manufacturing stage. This particular limitation does not appear or exist in the final product.

As to claim 25, the limitation that "a spacer is provided.....for supporting not only said cathode *during growth of said carbon nanotube* is not given patentable weight since it refers to an intermediate product manufacturing stage. This particular limitation does not appear or exist in the final product.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35

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U.S.C. 103(c) and potential 35 U.S.C. 102(e); (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (USPN 6812480).

As to claim 3, although Lee et al do not disclose a height of the spacer in the range as claimed by applicant, providing suitable dimension of the spacer would have been obvious to one of ordinary skill in the art for adjusting the height of the gate electrode with respect to the tips of the nanotubes. It has been held that where general conditions of the claim are discovered in the prior art, discovering the optimum or workable range (of the spacer height) involves only routine skill in the art. In re Aller, 105 USPQ 233.

Alternatively, it is the position of the Examiner that applicant's claimed height of the spacer is irrelevant since the height of corresponding nanotubes is not recited in claim 3 or claim 1. That is to say, the height of the spacer in absence of any referencing element (such as tip of the nanotubes) is irrelevant.

As to claim 5, Lee et al do not disclose the device including gate electrode offset in relation to the nanotube array. Since providing the offset configurations of the gate electrode and the nanotube arrays is known in the art for

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influencing desired electric field effect to the nanotubes, applicant's claimed configurations of the gate electrode and the nanotube arrays would have been obvious to one of ordinary skill in the art. Alternatively, applicant's claimed configurations of the gate electrode and the nanotube arrays would have been a matter of obvious design choice to one of ordinary skill in the art since applicant's claimed offset configuration does not solve any particular problem that is not solved by any prior art field emission device.

6. Claims 2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (USPN 6812480) in view of Lee et al (USPN 6339281, of record).

As to claim 2, Lee et al do not disclose a material of the spacer as claimed by applicant. Although silicon oxide, silicon nitride material is known in the field emission device art for providing spacers, Lee et al ('281) is cited for showing a silicon oxide material for the spacer (Figures 1-5). Therefore, it would have been obvious to one of ordinary skill in the art to provide the field emission device of Lee et al ('480) including silicon oxide material for the spacer.

As to claim 4, Lee et al do not disclose the nanotube array connected to the corresponding cathode electrode via a negative

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feedback resistance, as claimed by applicant. Although providing such resistive layer is known in the art for providing desired uniform current to the nanotubes, Lee et al (281) is cited for showing such a feature within the field emission device (Figure 5). Therefore, it would have been obvious to one of ordinary skill in the art to provide the field emission device of Lee et al (480) including negative feedback resistance for providing desired uniform current to the nanotubes.

7. Claim 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to claim 6, prior art of the record does not disclose applicant's claimed field emission device of claim 1 wherein the gate electrode is connected with the spacer via a thin film layer of the insulating material.

8. Claims 7-23 are in the condition for allowance.

As to claim 7-16, prior art of the record does not disclose applicant's claimed field emission device as fully recited in claim 7, wherein an end surface of each carbon nanotube array is flush with a top end of the spacer nearest the gate electrodes,

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and an intermediate layer having a predetermined thickness is arranged between the gate electrodes and the Spacer.

As to claim 17-23, prior art of the record does not disclose applicant's claimed field emission device as fully recited in claim 17, the claimed support member includes an insulative spacer and an intermediate layer as specifically recited in claim 17.

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Choi, Choi et al and Takai each are cited for showing general structure of a nanotube field emission device.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ashok Patel whose telephone number is 571-272-2456. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on 571-272-2457. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information

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for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Ashok Patel
Primary Examiner
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